УДК 616.133-007.271-089

© V. L. NESTERENKO

Ivano-Frankivsk National Medical University

Non-standard situation during the reconstruction of carotid basen

В. Л. НЕСТЕРЕНКО

Івано-Франківський національний медичний університет

НЕСТАНДАРТНІ СИТУАЦІЇ ПРИ РЕКОНСТРУКЦІЯХ КАРОТИДНОГО БАСЕЙНУ

The article adduces the results of clinical and instrumental examination of 112 patients who underwent revascularisated interventions on carotid bifurcation in the period from 2005 to 2013.

У статті проаналізовано результати клінічного й інструментального обстеження 112 хворих, яким виконували реваскуляризуючі втручання на каротидній біфуркації в період з 2005 до 2013 року.

Stating the problem and analysis of the last studies and publications. The number of patients with cerebrovascular disease that are caused by occlusive-stenotic injuries of carotid arteries is increased annualy. So, the number of first detected cases of ischemic stroke in Ukraine reaches 120 thousand per year, and more than 2/3 of them are caused by hemodynamically significant injuries of extracranial arteries. Clinical efficiency of typical desoblitirated interventions on the carotid bifurcation is demonstrated by several randomized multicenter studies. However, with the accumulation of sufficient experience of similar surgery interventions and increasing number of non-standard intraoperative situations, and therefore non-standard surgical reconstructions caused by the presence not only of obliterative brachiocephalic atherosclerotic lesions bifurcation but secondary local changes of arterial segments that have arisen under the influence of comorbidity (which pathophysiologically led to complication of intraoperative clinical situation). According to the various authors, these figures ranged from 0.9 to 36 %. The growth of this kind of complication, most authors associate with typical reconstructive solution, not adequate surgical technique and chosen way of carotid angioplasty. We have to observe when one or another typical way of reconstructive intervention is applied without considering of the type, degree of atherosclerotic lesions of the arteries, as well as local manifestations of comorbidity both primary and secondary pathologically injuried segment of the artery. The subject of discussion is the choice of method of surgical intervention of indicated primary-secondary complicated local clinical situation.

The aim of the study. We analyzed the results of surgical treatment of patients with hemodynamically significant stenosis or occlusion of the carotid arteries complicated by other (secondary) pathological changes in local vascular complications or consequences in the area of the artery to be reconstructed.

Materials and methods. We analyzed the results of clinical and instrumental examination of 112 patients who had revascularisation of carotid bifurcation in the period from 2005 to 2013. The average age of patients was 59,5 ± 9,02 years, most patients – male (65 [82.95 %]). The most detected comorbidities are: hypertension – 52 (74.62 %), obliterating atherosclerosis of lower limb arteries – 49 (62.5 %), ischemic heart disease – 28 (28.03 %), diabetes – 16 (19.32 %), nicotine addiction – 57 (65.15 %). In addition to clinical examination with determination of neurologic status, all patients underwent Doppler ultrasound using the device Philips EnVisor to determine the nature and amount of damage. During the suspicion of prolonged stenosis was performed selective arteriography (Siemens Multistar +) or spiral computed tomography (CT angiograph LightSpeed GE Medical Systems) in angiographic mode to detect distal limit of damage arteries. Patients with a stroke or a distinct clinical cerebral ischemia should undergo computed tomography.

Indications for surgical treatment by ultrasound scanning in patients of this group were stenosis of the internal carotid artery (ICA) over 70 % – in 48 (55.7 %) patients, more than 60 % stenosis with signs of degradation plaque – in 18 (29.5 %), limited ICA occlusion – in 9 (10.2 %), a combination of hemodynamically significant stenosis of the ICA with

abnormal tortuosity – in 8 (4.6 %). Most patients had clinical symptoms of chronic cerebral vascular insufficiency as dyscirculatory encephalopathy of I and II degree – 58 patients (53.4 %), transient ischemic attacks – 24 (18.2 %) 28 (25.4 %) patients with ischemic stroke. Only 8 patients(9.0 %) had the asymptomatic disease. In order to determine the tolerance of the brain to the ischemia patients underwent transcranial Doppler during which was measured linear flow velocity in the middle cerebral artery at rest, at constricted ipsilateral common carotid arteries and with hypercapnia.

All patients were operated under general endotracheal anesthesia. Retrograde pressure in ICA was monitored intraoperatively. Systemic blood pressure during compression ICA was maintained by medication for blood pressure in retrograde ICA at a level below 50 mmHg. As a result of instrumental examination and intraoperative data audit of carotid arteries patients were divided into 6 groups:

Limited ICA stenosis (up to 2 cm) – 58 (59.9 %) patients;

prolonged ICA stenosis (more than 2 cm) – 47 (49.1 %);

ICA stenosis combined with pathological tortuosity Universal CA – 2 (2.5 %);

ICA stenosis combined with pathological tortuosity External CA–2 (1.5 %);

ICA stenosis combined with pathological tortuosity of the same ICA–plot below atherosclerotic stenosis 4 (2.5 %);

ICA occlusion with preservation of permeability of the distal extracranial department – 4 (3.2 %).

Most patients from the first and second group (72 [62.0 %]) underwent carotid endarterectomy (64 – on classical technique with complete amputation of ICA at the bifurcation, endarterectomy of the distal direction and restoring permeability of the vessel at the bifurcation of continuous circular suture. In 17 (10.8 %) patients was made carotid endarterectomy with a U-shaped plastic of mouth ICA proposed by PA Paulikasom; in 33 (15.2 %) – the classic carotid endarterectomy with plastic of arteriotomic hole with patch of polytetrafluoroethylene PTFE. In 36 patients with prolonged damage of ICA was done classic carotid endarterectomy with plastic of arteriotomic hole (in 58 patients – PTFE), two patients with ICA diameter at the mouth to 1 cm carotid endarterectomy was performed with suturing arterotomic cut with noninvasive continuous suture. In 8 (6.5 %) patients, when hemodynamically significant stenosis of the ICA combined with tortuosity of Common CA, External CA and / or actual pathological tortuosity of Inner CA by resection of the stenosed segment of the ICA and resection of pathologically tortuous previously detected segment CA with anastomosis formation (with plot of the bifurcation of the external carotid artery (ECA). Patients with limited ICA occlusion in 1 case was successfully done classical carotid endarterectomy with plastic of arteriotomic hole with PTFE-patch and in 2 case was performed carotid endarterectomy with eversion methodology.

Results of researches and their discussion. Clinical results: 101 (92.8 %) patients assessed as good, there was regression (more or less) of neurological symptoms. In 9 (5.7 %) patients neurological symptoms remained unchanged but within five years of observation was not seen serious ischemic neurological signs. In 1 patient was developed ischemic stroke intraoperatively and remained stable effects of hemiparesis. The cause of stroke in this patient probably was embolism of branches of the middle cerebral artery with atherosclerotic plaque fragments and parietal thrombus, which arisen at the stage of selection artery (in the audit destruction of artery was revealed on the surface of the wall plaque thrombotic layers). Hemorrhagic complications were observed in the early postoperative period in 7 (3.4 %) patients, in 4 of them the hemostasis achieved conservatively, in 2 cases the hematoma formed in the area of the wound that led to repeated surgery to evacuate the hematoma and hemostasis. Among these patients, in 3 patients diffuse bleeding of surrounding tissues was observed, in 1 – found bleeding in the area of punctures in PTFE-patch, which was stopped by imposing additional seams and using local hemostatics. All hemorrhagic complications developed at the height of arterial hypertension in the early postoperative period. Symptoms of damage of cranial nerves were observed in 11 patients (15.5 %), all of which were transient and disappeared within two months. These complications have developed in most cases (8 [11.6 %]) in patients with extended (more than 2 cm) damage of ICA and the existing pathological tortuosity (one or two of the above writing segments), which required its selection on a significant gap.

Long-term results (up to 5 years) were followed in 87 patients (64.4 %). Hemodynamic significant restenosis were found in 7 patients after eversion carotid endarterectomy, in 2 – after classical carotid endarterectomy with patch, in 1 – occlusion of the reconstructed segment (only 10 [18.8 %]). Complications in patients whose reconstruction was performed by resection of one or more segments of the CA in remote period was not seen.

Conclusions. 1. We consider reasonable the using of carotid endarterectomy eversion methods in limited

(up to 2 cm) ICA stenosis, when it is possible to completely remove plaque or securely fix intima distally and with a sufficient diameter BCA. The advantage of this technique is restoring of blood flow in the vessel without narrowing and turbulent flows in the lumen of the artery.

2. Using classical carotid endarterectomy with patch angioplasty is justified with: ICA injuries at considerable intervals; the presence of multiple calcified inclusions in artery wall; low tolerance of cerebrum to ischemia. Patch type is determined individually. The patients with hypertension is preffered to use PTFE patch.

3. During the combination of pathological sinuosity of one CA segment and functionally significant stenosis of the ICA the best variant of carotid bifurcation reconstruction is resection of secondary changed convulted part of common CA, external CA and initial part of ICA with stenosing segment and the formation of a new carotid bifurcation.

REFERENCES

1. Organization of Stroke Care: Education, Referral, Emergency Management and Imaging, Stroke Units and Rehabitation / M. Brainin, T. S. Olsen, A. Chamorro [et al.] // Cerebrovascular Diseases. – 2004. – Vol. 17 (Suppl 2). – P. 1–14.
2. The Coordinating Committee of the National Choresterol Education Program; National Heart, Lung, and Blood Instotute; American College of Cardiolgy Foundation, and American Heart Associationg: Implications of recent clinical trials for the National Choresterol Education Program Adult Treatment Panel III guidelines / S. M. Grundy, J. I. Cleeman, C. N. Merz [et al.] // Circulation. – 2004. – Vol. 110. – P. 227–239.
3. Gender differences in the risk of of ischemic stroke and periferal embolism in atrial fibrilation: the Anticoagulation and Risk factors in Atrial fibrilation (ATRIA) study / V. C. Fang, D. E. Singer, Y. Chang [et al.] // Circulation. – 2005. – 112. – 1687–1691.
4. Type 2 diabetes as a <coronary heart diesease equivalent>: an 18-year prospective population-based study in Finnish subjects / A. Juutilainen, S. Lehto, T. Ronnemaa [et al.] // Diabetes Care. - 2005. – Vol. 28. – P. 2901–2907.
5. Богуславский Д. Д. Методика количественной оценки реабилитационного потенциала у инвалидов вследствие мозгового инсульта // Український вісник психоневрології. – 2005, – Т. 13, вип. 4 (45). – С. 11–14.
6. Епідеміологія мозкового інсульту в Україні / Мыщенко Т. С., Здесенко І. В., Коленко О. І. [та ін.] // Український вісник психоневрології. – 2005. – Т. 13, вип. 1 (42). – С. 23–28.
7. Clinical Classification Schemes for Predicting Hemorrage: Results from National Regystry of Atrial Fibrilation (NRAF) / F. Brain Gage, Yan Yan, E. Paul Milligan [et al.] // Am. Heart J. – 2006. – Vol. 151 (3). – 713–719.
8. On behalf of the ASPEN Study Group. Efficacy and Safety of Atorvastatin in the Prevention of Cardiovascular End Points in Subjects With Type 2 Diabetes The Atorvastatin Study for Prevemtion of Coronary Heart Disease Endpoints in Non- Insulin-Dependent Diabetes Mellitus (ASPEN) / R. Knopp, M. d'Emden, J. Smilde, S. Pocock // Diabetes Care. – 2006. – Vol. 29. – P. 1478–1485.
9. The effects of different doses of atorvastatin on plasma endotelin-1 levels in type 2 diabetic patients with dyslipidemia / H. C. Lam, C. H. Chu, M. C. Wei [et al.] // Exp. Biol. Med. (Maywood). – 2006. – Vol. 231. – № 6. – P. 1010–1015.
10. Система етапной реабилитации больных с мозговыми инсультами / Козелкин А. А., Ревенько А. В., Козелкина С. А. [и др.] // Мистецтво лікування. – 2006. – № 7 (33). – С. 62–65.
11. Диагностика, лечение и профилактика мозговых инсультов / Козелкин А. А., Дарий В. И., Шевченко Л. А. [и др.]: методическое пособие для врачей-неврологов. – Запорожье : Керамист, 2006. – 152 с.
12. Система етапной помощи больным с мозговыми инсультами / Козелкин А. А., Козелкина С. А., Равенько А. В. [и др.] // Международный неврологический журнал. – 2006. – № 3 (7). – С. 113–123.
13. Ощепкова Е. В. Гипертоническая энцефалопатиия // Внутренняя медицина. – 2007, № 7. – С. 48–54.

Received 29.01.13